Estimation of Tropospheric Fluctuations using GI 'S Data

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Tropospheric turbulence is the limiting error source for Ka-band radio experiments and it limits coherence of high frequency radio interferometry. We discuss a method of extracting tropospheric fluctuation statistics from the G] 'S FLINN database. This database, an ongoing IGS effort at JPL, since 1992, produces daily solutions for orbits, receiver locations, clock offsets, tropospheric delays and residuals. GPS data is obtained in all meteorological conditions at over 30 sites with excellent temporal resolution.

It is assumed that the tropospheric fluctuations are well understood by the frozen flow Kolmogorov turbulence model and the hypothesis is formed that the G] 'S residuals are dominated by tropospheric delay fluctuations. The elevation and site dependence of the G 1 'S residuals are discussed and are in agreement with the expectations of troposphere delay fluctuations. The GPS residuals are shown to have temporal statistics that are consistent with the assumed turbulence model. The turbulence parameter (C_n) is extracted from the GI 'S residuals and the absolute C_n magnitudes are found consistent with both WVR and VLBI measurements. The seasonal and diurnal C_n dependence is presented and compared with a simple wet refractivity model.

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